PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Alberto Alvarez-Calderon F.	Group Art Unit:	3617
Serial Nº:	09/677,583	Examiner:	E. Swinehart
Filed:	September 29, 2000	Attorney Docket Nº:	1186-001

For: SUBMERSIBLE HULL AND HYDROFIELD

APPENDIX I FILED WITH AMENDMENT PURSUANT TO 37 C.F.R. § 1.111

Mail Stop Non-Fee Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Office Action of April 30, 2003, Paper Nº 5, in the above-entitled application, please review and include the following Appendix:

NOTE: This text and figures are from SUPPLEMENTARY AMENDMENT of March 13, 2003 which was not entered by Examiner before his action of April 30, 2003. Applicant appreciates interview granted by Examiner on March 6, 2003. It is summarized below.

1. DVD DEMONSTRATES SUCCESSFUL TRANSONIC HULL MODEL TESTS:

During the interview, applicant showed a DVD of 23-minute length summarizing several years of privately funded research, development, and model tests of Transonic Hulls (TH). The DVD covered four parts:

Part I Tow tank tests of a 6 foot model.

Part II Tests of electric powered remote control TH surface model of 4 feet length. Tests were in a pond, and in beach surf. The tests in surf also showed a model of a conventional patrol boat of the same size and weight, for comparison. The TH model showed more favorable stability and control characteristics in surf with much less disturbances in pitch, surge, yaw, and sway. It also exhibited a stronger upright tendency, and a self righting tendency in the presence of large diagonal and cross seas.

Part III Tests of a 6-foot remote control TH surface model powered by an internal combustion engine. These tests were in a pond, in the bay with chop, and across the large wake of the manned chase boat.

Part IV Tests of a 3-foot remote control TH surface subsurface model showing surface and subsurface operation in a pond and in beach surf.

1.1 Remarks on Part I: Tank tests of a 6 ft. model

The stills of tow tank tests in the DVD clearly showed the hydrofield and rays of the first TH patent, which phenomena were also confirmed in the subsequent tests of the powered TH models.

1.2 Remarks on Part II: Tests of a 4 ft. TH powered model in pond and in beach surf

Examiner noted the new type of pitch control capability displayed by the electric powered TH model, namely, Approximately *15 deg and -10 deg hull angles sustained in time. Applicant explained this was accomplished by its powerful trailing edge flaps, and was intended also to provide steady pitch attitude in rough sea by means of gyroscopic sensors with electric output to attain, with rapid servo control on the flap, a smooth ride. This feature is covered in U.S. Patent Application 09/677 897, for example its Figs. 14D and 14E.

1.3 Remarks on Part III: Tests of 6 ft. TH powered model in pond and bay

There is enclosed in SHEET 1 (attached), a photo of the 6 ft. TH gas powered model shown in Part III of the DVD. Examiner properly observed the hydrodynamic regime in which the bow is raised slightly above the water level, which applicant identified as "transplannar." This is covered in Figs. 14a and 14b of U. S. Patent Application 09/677 897, and some of its Claims. The term "transplannar" denotes a regime different from planning, in that the angle of attack of TH's bottom surface is considerably smaller than that of planning hulls, as a result of TH's maximum beam located at its stern, and in TH not having lateral outflows typical of conventional planning hulls.

1.4 Remarks on Part IV: Surface and subsurface TH model tests in pond and surf

This part of the DVD showed surface and subsurface testes of the three feet electric powered TH model equipped with hydro wings and elevator such as shown in Figs. 3 and 5b of present Patent Application 677 583. Tests were made in pond and ocean surf. High speed and maneuvering

regimes were displayed both on surface and subsurface. Also, Part IV clearly displayed TH's capability of piercing large steep waves, large broken and breaking waves, and also accepting being overtaken by steep and broken waves, such as shown in Figs. 8a and 8b of the present patent application. Examiner remarked on the model's high speed displayed subsurface. Applicant concurred it was very fast (perhaps because favorable Reynolds number regime and/or transitions which were not ascertainable in tests). Photos of the hull of the surface/subsurface model without its wings are shown in attached SHEET 2. SHEET 3 shows proof of the unique and favorable X regime, which is shown in Patent Application 677 897.

2. REVIEW OF PHOTOS OF TESTS OF MANNED TH BOATS IN BEACH SURF

Photos of two full size manned TH boats (length 13 and 20 ft.) were shown. Tests covered the following:

- Neutral point in static heel for computer calibration
- Natural period of roll with zero forward speed (a motion which includes effect of virtual mass)
- Pitch attitudes and pitch stability when encountering large, steep, curled, and broken waves.

The photos demonstrated that the intended pitch stability was attained. Photos of these tests are very important for calibration of dynamics in pitch and heel with computer programs having only hydrostatic pitch and roll output, as are those of affordable costs.

3. REVIEW OF PRELIMINARY DESIGNS OF SEVERAL TH BOATS

Based on TH's R&D, model tests and manned boat tests with zero forward speed, conducted under the writer's direction, it has become possible to carry out preliminary designs of TH boats, several of which were shown in the interview with the aid of three-view drawings. These designs follow the principal parameters of the patent applications of TH, including shape, relation of weight to length's cube, power loading (weight to horsepower), and hydrostatic righting moments. Beyond these conventional parameters, the preliminary designs exploit new criteria for TH boats such as

beam loading, water plan area loading, longitudinal volume distribution of the present patent application, and lower freeboard. The preliminary designs reviewed are:

- TH-20, a two seater surface sport version derived from manned tests of TH-13
- TH 31, a three seat full stealth surface-subsurface military design for over-the-horizon insertion-extraction of special forces, or as a surface-subsurface spot boat for high speed cruise in rough ocean, or for surfing and penetrating large seas, and for sea rescue
- TH-60, a powerful fast surface-only luxury yacht

These designs were hydrodynamically advanced, and also provided space for occupants, powerplants, equipment, etc., taking into account riding qualities, entry and exit of occupants, etc.